IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

1. (Currently Amended) A method of defining a surface of a model, comprising:

sub-sampling the surface at a higher ~~given~~ rate or resolution than the rate or resolution of an original sampling of the surface using~~with~~ generated sample points;

determining automatically sample points that add detail to the surface when displaced by a displacement map, the map being applicable to points of any arbitrary surface, by using a local criteria calculated based on displacements of neighboring sample points by the displacement map; and

increasing automatically a resolution of the surface of the model by keeping the determined sample points and discarding other sample points.

2. (Previously Presented) The method according to claim 1, further comprising moving determined sample points to increase detail represented thereby.

3. (Previously Presented) The method according to claim 1, wherein the moved sample points are moved toward a feature of the displacement map.

4. (Previously Presented) The method according to claim 1, wherein the local criteria comprises a feature metric measuring a local feature within a locality of the sample points displaced by the displacement map.

5. (Previously Presented) The method according to claim 2, wherein said moving comprises moving a determined sample point toward a direction of a high rate of change according to the displacement map.

6. (Previously Presented) The method according to claim 1, wherein said determining comprises determining that sample points are points of significant curvature.

7. (Previously Presented) The method according to claim 1, further comprising preferentially connecting vertices of polygons of the surface along one of edges and borders of a sampled area of the surface.

8. (Previously Presented) The method according to claim 7, wherein the polygons are triangles and wherein vertices of the triangles are feature points.

9. (Original) The method according to claim 1, wherein the model is a polygon mesh model.

10. (Currently Amended) A method of defining a surface comprising automatically refining a representation of the surface by generating sample points sampling the surface at a given sample rate higher than an original sampling rate adding surface detail, for sample points automatically determining one of a location and a direction of a local feature from a displacement map applied to sample points, and either moving or discarding sample points according to the location or direction of the local feature, the map being applicable to points of any arbitrary surface.

11. (Currently Amended) A method of creating a model, comprising:

uniformly sampling the model at a given sample rate or resolution higher than an original sampling rate adding model detail;

identifying automatically areas of details or features of sample points of the sampled model as displaced by a displacement map, the map being applicable to points of any arbitrary surface; and

increasing resolution of the sampled model by discarding some sample points according to the areas of details or features and moving other sample points according to the areas of details or features.

12. (Currently Amended) A method of obtaining a surface that has been sampled at a given sample rate higher than an original sampling rate adding surface detail, comprising automatically deriving local feature criteria of the sampled surface according to a displacement map thereof and using the local feature criteria to automatically determine which sampled points of the surface to keep for displacement by the displacement map and only keeping the so-

determined sample points for displacement by the displacement map, the map being applicable to points of any arbitrary surface.

13. (Previously Presented) A computer-implemented method of displacing a parameterized surface comprised of subdivision surfaces, the method comprising:

generating two-dimensional height maps for a subdivision surface by sampling a height field at a given resolution to calculate height values for points in the subdivision, the height field being applicable to points of any arbitrary surface;

generating two-dimensional feature maps, for the subdivisions, that identify features of the height field, by using the height map and height field to calculate approximate degrees and directions of local curvature.

14. (Currently Amended) A computer-implemented method of creating a surface, comprising:

approximating a surface with sample points sampling the surface at a given resolution higher than an original sampling rate adding surface detail;

using a displacement function to compute a height of a sample point and heights of sample points in a local neighborhood of the sample point, the function being applicable to points of any arbitrary surface;

deriving feature criteria for the sample points using local change in the heights;

representing the surface with the sample point when the feature criteria indicates that the local neighborhood is not substantially flat; and

representing the surface without the point when the feature criteria indicates that the local neighborhood is substantially flat.

15. (Currently Amended) A computer-implemented method of creating a surface, comprising:

approximating a surface with sample points sampled at a given sample rate higher than an original sampling rate adding surface detail;

using a displacement function to compute a height of a sample point and heights of sample points in a local neighborhood of the point, the function being applicable to points of any arbitrary surface;

using the heights to obtain a criteria of local change in the local neighborhood;

representing the surface without the sample point when the criteria of local change indicates that the point is not a feature point of the local neighborhood; and

representing the surface with the point when said criteria of local change indicates it is a feature point.

16. (Previously Presented) The method according to claim 15, further comprising using the heights to approximate a gradient for the point if its local change criteria indicates that it is at a point of local change among the heights, and repositioning the point to a location in the direction of the gradient.

17. (Previously Presented) The method according to claim 16, further comprising adding a new point in the neighborhood at an extrema in the local neighborhood in the direction of the gradient.

18. (Previously Presented) A computer-implemented method of displacing a surface, comprising:

identifying features in local neighborhoods of points in a range, the range resulting from a displacement map applied to a domain comprising sample points of a given resolution or rate approximating the surface, the features comprising locations or directions of detail in the range of the displacement map, the map being applicable to points of any arbitrary surface;

adjusting at least some points in the range, or corresponding points in the domain according to the locations or directions of the features;

identifying borders of features in the range of the displacement map; and

making a displaced surface mesh by using the borders to constrain a triangulation of the adjusted points.

19. (Currently Amended) A computer-implemented method of displacing a surface, comprising:

deriving a set of points for triangles in a tessellation of the surface, by

sampling the surface at a given rate or resolution to create a distribution of sample points in a triangle,

calculating height values for sample points in the distribution by sampling a height field,

calculating feature metrics for respective sample points in the distribution by approximating second derivatives of the points using height values of neighboring points in the distribution, and

refining the distribution of sample points by eliminating sample points from the distribution that have feature metrics indicating a respective locally flattish region of the height field, and by keeping non-eliminated sample points in the ~~distrubution~~distribution.

20. (Previously Presented) The method according to claim 19, wherein said deriving further comprises:

calculating feature orientations for sample points in the distribution by using height values of neighboring points to find approximate directions of approximate greatest change in the height field, and

adding to the distribution sample points near extrema and features of the height field.

21. (Previously Presented) The method according to claim 20, further comprising:

identifying borders of features in the height field and using the borders to constrain a triangulation of the distribution of sample points.

22. (Previously Presented) The method according to claim 19 wherein the distributions comprise grids of sample points uniformly distributed on the triangles, using sides of triangles as axes of the grid.

23. (Previously Presented) A method of displacing a surface, comprising:

deriving a set of points for triangles in a tessellation of the surface, by

creating a grid of points on and in a triangle,

calculating height values for points in the grid by sampling a height field, the height field being applicable to points of any arbitrary surface,

calculating feature metrics for points in the grid by approximating second derivatives of the points using height values of neighboring points,

calculating feature orientations for points in the grid by using height values, according to the height field, of neighboring points to approximate discrete gradients in the height field,

calculating, according to the height field, height values for new points in the triangle that are away from the points in the grid in the directions of the feature orientations,

identifying new points that are near local extrema and features of the height field by approximating second derivatives of the new points using the height values of the new points, and

compiling a set of points comprising grid points and identified new points.

24. (Previously Presented) A method of displacing a surface, comprising:

parameterizing the surface by tessellating it into a first set of triangles;

deriving a set of points for each triangle in the first set, by

creating a non-orthogonal coordinate system defining points on and in the triangle, wherein the two shortest sides of the triangle are axes of the coordinate system and the triangle vertex where the axes intersect is an origin of the coordinate system,

calculating a height value for most of the points by, for each such point, sampling a height field,

calculating a feature metric for most of the points by, for each such point, summing a plurality of Taylor approximations taken in directions of a plurality of points neighboring the point, wherein the Taylor approximations are calculated using the height values of the neighboring points, and wherein the feature metric approximates an amount of local curvature in the height field in a local area of the point,

at least one of discarding, ignoring, and flagging as unnecessary points having a feature metric indicating that the point is in a substantially locally flat area of the height field,

calculating a feature orientation for most of the points that were not discarded, ignored, or flagged by, for each such point, using least squares minimization to fit a linear function to a plurality of points neighboring the point, wherein the feature orientation is a discrete gradient of the height field that approximates a direction from the point that has the greatest rate of local height change,

for most points that have a feature orientation, sampling the height field at points uniformly distributed along a line segment within a neighborhood, wherein the line segment passes through the point in the direction of the feature orientation of the point, and wherein a rate of height change in the height field along the line segment is approximated for the point and each sample point by using their sampled height field values,

for most points that have a line segment, relocating the point to a location of a closest sample point on the line segment that has a rate of height change above a threshold, and adding points at sample points on the line segment having a rate of height change indicating an extrema or feature in the height field;

creating a second set of triangles by constraining a Delaunay triangulation of the set of points of each triangle in the first set of triangles, wherein a constraint is a feature border of the height field in the triangle that is identified by the set of points; and

building a final displaced surface geometry using the second set of triangles.